DYNAMICS OF INFLATION IN BRICS COUNTRIES: AN ANALYSIS OF NATURE, CAUSES & IMPACT

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INTRODUCTION

Inflation is one of the prime economic parameter reflecting sustained rise in general price level of goods and services over a period of time. It is considered as a serious hurdle in the process of growth, as it causes rise in the prices of inputs and rate of interest, implying a rise in the cost of investment. Further, it also causes a fall in real income of the people entailing that the people are able to buy less goods and services with the same money income. Every country experiences it during the process of its growth and development. In the world of globalization, inflation is undeniable, and one of the chief and dynamic macroeconomic issues confronting almost all the economies of the world.

Inflation is a sign, that an economy is growing, but excessive economic growth can be detrimental as it can lead to hyperinflation as experienced. In general, unpredicted and running inflation has unprecedented effects on an economy because it distorts and disrupts the price mechanism, discourages investment and saving, and adversely affects fixed income group, creditors etc. At the other extreme, an economy with no inflation has essentially stagnated, and the situation may be harmful to other sectors in the economy with falling prices, profits, and employment.[1] The right level of economic growth and inflation is somewhere in the middle, hence, creeping or mild inflation can be viewed as having favorable impact on the economy.

The level of inflation is an aspect of major concerns to government, businesses, and especially to individual consumers. If consumers face higher prices without being compensated with higher incomes, the increase in prices will directly affect their cost of living and consequently their quality of life. So, the price movements are nature's way of signaling to consumers that they should consume less of the commodity facing shortage, and more of the goods in glut, and to producers to produce more of what is in short supply and less of what is available in plenty.[2]

Inflation management is one of the hardest tasks an economic policymaker has to undertake. It is one of the most dreaded (causing fear or dread or terror, an awful risk) and misunderstood economic phenomena, where the average price of all goods is on an increasing trajectory for some stretch of time.[3] The goal of each and every Government is to maintain low and relatively stable levels of inflation. High inflation is bad for economy, as it adversely affects economic performance. Reducing inflation also has costs associated with it, e.g. loss of output and higher rates of unemployment. Generally, the problem of inflation

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1 Sahadudhhen I (2012), A Cointegration and Error Correction Approach to the Determinants of Inflation in India, International Journal of Economics Research, January, p-105

2 Basu Kaushik (2011), Understanding Inflation and Controlling It, Gautam Mathur Lecture No. 14, Ministry of Finance, Government of India, 5th August, p-2

3 Ibid, p-2

is confined to national boundaries, caused by domestic money supply and price rises, but, in this era of globalization, effects of economic inflation cross borders and percolate both developed and developing countries.

GENESIS OF INFLATION

Inflation refers to overall increase in prices and not the relative price increases of some goods. When the price of some goods increases, we can respond by trying to supply more of those goods. But if the prices of all or virtually all goods increase, there is little we can do in terms of supply, because there is no known way of suddenly providing more of all goods.[4] This is the reason why, when there is overall higher inflation, we have no choice but to turn to some form of demand management, even while working on easing specific supply bottlenecks that may exist.

Inflation in general is of three types as describes by Robert J Gordon in his triangle model.[5]

- Demand-pull Inflation: Caused by increases in aggregate demand due to increased private and government spending, etc. Demand inflation is constructive to a faster rate of economic growth since the excess demand and favorable market conditions will stimulate investment and expansion. A major demand-pull theory centers on the supply of money. Accordingly, inflation may be caused by an increase in the quantity of money in circulation relative to the ability of the economy to supply (its potential output). This is most obvious when governments finance spending in a crisis, such as a civil war, by printing money excessively, often leading to hyperinflation, a condition where prices can double in a month or less.
- Cost-push Inflation: Also called 'supply shock inflation', caused by drops in aggregate supply due to increased prices of inputs, for example. Take for instance a sudden decrease in the supply of oil, which would increase oil prices. Producers for whom oil is a part of their costs could then pass this on to consumers in the form of increased prices.
- Built-in Inflation: Induced by adaptive expectations, often linked to the 'price/wage spiral' because it involves workers trying to keep their wages up (gross wages have to increase above the CPI rate to net to CPI after-tax) with prices and then employers passing higher costs on to consumers as higher prices as part of a 'vicious circle'. Built-in inflation reflects events in the past, and so might be seen as hangover inflation.

Inflation is one of the burning, unsolved, and continual problems facing many of the developing countries around the world. In the long run inflation is generally believed to be a monetary phenomenon while in the short and medium term it is influenced by the relative elasticity of wages, prices and interest rates. The question of whether the short-term effects last long enough to be important is the central topic of debate between monetarist and Keynesian schools. In monetarism prices and wages adjust quickly enough to make other factors merely marginal behavior on a general trend line. Monetarists believe that inflation is

[4] Basu Kaushik (2011), Op. Cit., p-25

[5] Solow Robert M (2004), Productivity Growth and Unemployment: The Collected Essays of Robert J Goron, Cambridge University Press, p-34

a purely monetary phenomenon that refers not only to movements in the quantity of money but also to the factors that influence the public's willingness to hold money. In the Keynesian view, prices and wages adjust at different rates, and these differences have enough effects on real output to be long term in the view of people in an economy.

A great deal of economic literature concerns the question of what causes inflation and what effect it has. Most causes of inflation can be divided into two broad areas: quality theories of inflation, and quantity theories of inflation. Many theories of inflation combine the two. The quality theory of inflation talks about expectation of a seller accepting currency to be able to exchange that currency at a later time for goods that are desirable as a buyer. The quantity theory of inflation rests on the equation of the money supply, its velocity, and exchanges. Adam Smith and David Hume proposed a quantity theory of inflation for money, and a quality theory of inflation for production.

Keynesian economic theory proposes that money is transparent to real forces in the economy, and that visible inflation is the result of pressures in the economy expressing themselves in prices. A fundamental concept in Keynesian analysis is the relationship between inflation and unemployment, called the Phillips curve. This model suggests that there is a trade-off between price stability and employment. Therefore, some level of inflation could be considered desirable in order to minimize unemployment. The Phillips curve model described the US experience well in the 1960s but failed to describe the combination of rising inflation and economic stagnation (sometimes referred to as stagflation) experienced in the 1970s.

Modern macroeconomics describes inflation using a Phillips curve that shifts (so the trade-off between inflation and unemployment changes) because of such matters such as supply shocks and inflation becoming built into the normal workings of the economy. The former refers to such events as the oil shocks of the 1970s, while the latter refers to the price/wage spiral and inflationary expectations implying that the economy normally suffers from inflation.[6] Thus, the Phillips curve represents only the demand-pull component of the triangle model.

Supply-side economics asserts that inflation is caused by either an increase in the supply of money or a decrease in the demand for balances of money. Thus, the inflation experienced during the Black Plague in medieval Europe is seen as being caused by a decrease in the demand for money, the money stock used was gold coin and it was relatively fixed, while inflation in the 1970s is regarded as initially caused by an increased supply of money that occurred following the US exit from the Bretton Woods gold standard. Supply-side economics asserts that the money supply can grow without causing inflation as long as the demand for balances of money also grows.

Effects of Inflation on an economy are various and can be simultaneously positive and negative. Negative effects of inflation include a decrease in the real value of money and other monetary items over time, uncertainty over future inflation which may discourage

[6] Jankovic Ratko (2007), Theoretical Approach to Inflation Control: Evidence of Different Means undertaken. The Case Study of Serbia, Dissertation, University of Paris, 25th June, p-11

investment and savings, and if inflation is rapid enough, shortages of goods as consumers begin hoarding out of concern that prices will increase in the future. Positive effects include ensuring that central banks can adjust nominal interest rates (intended to mitigate recessions), and encouraging investment in non-monetary capital projects.

MEASURES OF INFLATION

Inflation is measured as the percentage rate of change in price index of a country. There are several measures of inflation that depend on various sectors of the economy. Two commonly known measures of inflation, used in almost all the economies, and for which inflation rates/ indices are reported, are the Consumer Price Index (CPI) and the GDP Deflator. CPI measures prices of selected goods and services that affect consumers, and the GDP deflator measures prices of locally produced goods and services. Symbolically, GDP Deflator=GDP at Current Prices/ GDP at Constant Prices.

Other measures of inflation are; Cost-of-Living Index (COLI), similar to CPI and is often used to adjust fixed incomes and contractual incomes to maintain the real value of those incomes; Index of Industrial Production (IIP), which represents the volume of demand in the economy;the Reserve Money (RM), a measure of money supply in the economy; the Import Index (IMP), a measure of the influences of external factors on domestic prices; and the Producer Price Index (PPI), that measures prices received by producers. In India and US an earlier version of the PPI was called as Wholesale Price Index (WPI).

Measuring inflation requires finding objective ways of sorting out changes in nominal prices from other influences related to real activity. Inflation measures are often modified over time, either for the relative weight of goods in the basket, or in the way in which goods from the present are compared with goods from the past.

BRICS: AN OVERVIEW

The BRIC is a grouping acronym that refers to the countries of Brazil, Russia, India and China. It was first coined by Jim O' Neill, in 2001, in a paper titled 'Building Better Global Economic BRICs', which looked at the growth prospects of the four largest emerging economies that are culturally and geographically disparate.[7] The main finding was that the BRICs would play an increasingly important role in the global economy. So, the collective strength of the BRIC economies is of ever increasing importance to the strength of the global economy. Whilst mature economies across the globe grapple with towering budget deficits, anaemic growth and rising unemployment, the BRICs are expanding rapidly, lifting people out of poverty and driving the global economy.

The report on BRIC by Goldman Sachs made the world sit up and take notice of the potential economic clout of Brazil, Russia, India and China (BRIC). In the report it was clearly noticed that there is shift in global economic power from the developed to the developing countries. BRIC has emerged as groups which now stand up and nudge the world to acknowledge their clout and importance. These four countries, combined, currently account for more than 25

[7] The BRICS Report, Oxford University Press, New Delhi, 2012, p-ix

percent of the world's land area and more than 40 percent of the world's population. Further, these economies together accounted for about 46.8 per cent of the contribution to global growth in 2011.[8]

Goldman Sachs argued, since the four BRIC countries are developing rapidly, by 2050 their combined economies could eclipse the combined economies of the current richest countries of the world. These countries have been seeking to form a 'political club' or 'alliance' and thereby converting their growing economic power into greater 'geopolitical clout'. On almost every scale, they would be the largest entity, the biggest and fastest growing emerging markets on the global stage. In August 2010, Jim O'Neill of Goldman Sachs argued that Africa could be considered the next BRIC. Accordingly, South Africa was officially admitted as a BRIC nation on December 24, 2010 after being invited by China and the other BRIC countries to join the group. Thus, the BRIC cluster has now become plural – BRICS. Table 1 presents selected macroeconomic indicators of BRICS countries over a period from 2000-2011.

Table 1: Selected Macroeconomic Indicators

	Year	Brazil	Russia	India	China	South Africa
GDP at Current Prices (US$ Billions)	2000	644.3	259.7	476.4	1198.5	133.0
	2011	2492.9	1850.4	1676.1	7298.2	408.1
GDP in PPP (Purchasing Power Parity)	2000	1234.4	1120.9	1571.5	3014.9	295.8
	2011	2294.2	2383.4	4457.8	11300.0	555.1
GDP in PPP (% Share in World GDP)	2000	2.9	2.7	3.7	7.1	0.7
	2011	2.9	3.0	5.7	14.3	0.7
Population (Million Persons)	2000	171.3	146.3	1024.3	1267.4	44.5
	2011	194.9	142.4	1206.9	1348.1	50.6
Unemployment Rate (% of Total Labor Force)	2000	7.1	10.6	NA	3.1	25.6
	2011	6.0	6.5	NA	4.0	24.5
Trade (Merchandise)* (% Share in Global Trade)	2000	0.9	1.6	0.7	3.9	0.5
	2011	1.4	2.9	1.6	10.4	0.6
Trade (Services)* (% Share in Global Trade)	2000	0.6	0.6	1.1	2.0	0.3
	2011	0.9	1.3	3.2	4.3	0.3

Source: World Economic Outlook Database, IMF, 17th April 2012
* UNCTAD Statistics, 25th July 2012

The grouping has held annual summits since 2009, with member countries taking turns to host. Prior to South Africa's admission, two BRIC summits were held, in 2009 and 2010. The first five-member BRICS summit was held in April 2011. The most recent summit took place in New Delhi, India, on March 29, 2012. As of 2012, the five BRICS countries represent almost 3 billion people, with a combined nominal GDP of US$ 13.7 trillion, and an estimated US$ 4 trillion in combined foreign reserves. Presently, India holds the chair of the BRICS group.[9]

[8] Economic Survey, Government of India, 2012

[9] Wikipedia, the Free Encyclopedia, wikipedia.org/wiki/BRICS, viewed on 14th August 2012.

PRESENT STATE OF KNOWLEDGE

Though, a gigantic body of literature is available on estimation, determinants, and effects of inflation, most of them are confined to individual and/ or developed economies. A very few researchers have made attempts to describe the issue in reference to developing and emerging market economies. Following section presents a brief review of few prominent studies carried out by researchers in India and abroad.

A number of empirical studies conducted in the past shed some light on possible causes of inflation in developed countries or developing countries. Among these are Sargent and Wallace (1981), Darrat (1986), Narikawa (1988), Ghatak and Deadman (1989), Hoover (1991), Taylor (1992), Dhakal and Kandil (1993), Moser (1995), Tan and Cheng (1995), Feliz and Welch (1997), Crowder (1998), Brouwer and Ericsson (1998), and Mansor (1999).

Canetti and Greene (1991)[10] used Granger and Pierce causality tests for investigating the role of domestic money supply on inflation changes for six African countries and found that growth in money supply and the nominal exchange rate had a significant casual influence on inflation.Bank of Botswana (1998)[11] in 'Inflation in Southern Africa' considered changes in the cost of labor, a major cause of inflation variations in developed countries, but not in developing countries. It further mentioned that in an open and import dependent economy, where domestic inflation is largely determined by foreign prices and nominal exchange rate depreciation, the initial improvement of export competitiveness resulting from depreciation may eventually be offset by the consequent increase in prices.

Nachane and Lakshmi (2002)[12]attempted P-Star model for India using both annual and quarterly data for the period 1955–1995. To develop a model for gauging inflationary pressures in the economy, researchers used cointegration techniques, as the velocity in India was found to be trend stationary. The model was found to be best fitted to the data, and in out-of-sample forecasts, it significantly outperformed a seasonal ARMA benchmark model. Also the velocity gap version of the model was successful. John (2003)[13] used post liberalization data to study the causality between monetary aggregates and exchange rates. He employed Vector Autoregressive (VAR) framework to find as to which monetary aggregate explains the inflation in a better way. Though, the study could not trace clear evidence as to which monetary aggregates best explains inflation, the results of VAR model indicated sufficient reason to believe that broad money (M3) is a better measure to explain the changes in inflation.

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[10] Canetti E and Greene J (1991), Monetary Growth and Exchange Rate Depreciations as Causes of Inflation in African Countries: An Empirical Analysis, Mimeo, IMF, and Washington.

[11] Bank of Botswana (1998), Inflation in Southern Africa, The Research Bulletin, No. 16(1).

[12] Nachane DM and Lakshmi R (2002), Dynamics of inflation in India: A P-Star approach, Applied Economics, Volume 34, Number 1, January, pp. 101-110

[13] Rijo M John (2003), Inflation in India: An Analysis Using Post Liberalized Data, Working paper, October, Indira Gandhi Institute of Development Research, Mumbai.

Altissimo et al. (2005)[14] analyzed the long-run determinants of inflation differentials in a monetary union. The study aimed at establishing some stylized facts relating the regional dispersion in headline inflation rates in the euro area as well as in the main components of consumer price index. The researchers found that a relatively large proportion of inflation occurs in the Service category of the EU's harmonized consumer price index. Srinivasan et. al (2006)[15], estimated an augmented Phillips curve to examine the effect of supply shocks on inflation in India. In an ordinary least square framework they found that supply shocks have only a transitory effect on both headline inflation and core inflation. He stated that monetary policy in India is more focused towards the core inflation. Bishnoi and Koirala (2006)[16] in a study on robustness and stability of inflation in Nepal conducted cointegration analysis on inflation and its explanatory variables. The objective was to find the long- term relationship among inflation and its explanatory variables. The authors, with a view to find the short term relationship between variables under consideration also used Error Correction Mechanism (ECM) and found that ECM of inflation is stable and robust.

Andersson et al. (2009)[17] analyzed the determinants of inflation differentials and price levels in the euro countries. Using dynamical panel analysis the researchers concluded that inflation differentials are primarily determined by cyclical positions and the inflation persistence. Kandil and Morsy (2009)[18] also studied determinants of inflation with special reference to Gulf Cooperation Council (GCC) since 2003. Using an empirical model that included domestic and external factors, the author found that inflation in major trading partners of GCC appears the most relevant to domestic inflation in GCC. Further, higher public investment in Kuwait, Oman, and the United Arab Emirates was found to have main inflationary pressure in the long run.

Kishor (2009)[19] studied the role of real money gap and the deviation of real money balance from its long-run equilibrium level for predicting inflation in India. He found real money gap a significant predictor of inflation in India. Greenidge and DaCosta (2009)[20] used unrestricted error-correction model and bounds test for cointegrating analysis to capture new developments in the inflationary process in selected Caribbean economies (Jamaica, Guyana, Barbados and Trinidad and Tobago). The findings indicate that the determinants for inflation in the Caribbean are both cost-push and demand-pull.

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[14] Altissimo F, Benigno P and DR Palenzuela (2005), Long-Run Determinants of Inflation Differentials in a Monetary Union, NBER Working Paper No. 11473, July, pp 205-247.

[15] Srinivasan N, V Mahambare and M Ramachandran (2006), Modeling Inflation in India: A Critique of the Structural Approach, Journal of Quantitative Economics, Volume 4, No. 2,June, pp45-59.

[16] Bishnoi TR and TP Koirala (2006), Stability and Robustness of Inflation Model, Journal ofQuantitative Economics, Volume 4, No. 2, June, Pp. 114-130

[17] Andersson M, Masuch K and Schiffbauer M (2009), Determinants of Inflation and Price Level Differentials across the Euro Area Countries, European Central Bank Working Paper Series No. 1129

[18] Kandil M and Morsy H (2009), Determinants of Inflation in GCC, IMF Working Paper No. 09/82

[19] Kishor N Kundan (2009), Modeling Inflation in India: The Role of Money, MPRA Paper No. 16098.

[20] Greenidge Kevin and Dianna DaCosta, Determinants of Inflation in Selected Caribbean Countries, Business, Finance & Economics in Emerging Economies, Volume 4, Number 2, pp-371-397

Dua and Gaur (2009)[21] investigated determination of inflation in the framework of an open economy forward-looking as well as conventional backward-looking Phillips curve for eight Asian countries - Japan, Hong Kong, Korea, Singapore, Philippines, Thailand, China Mainland and India. Using quarterly data from 1990s to 2005 and applying the instrumental variables estimation technique, they found that the output gap, and at least one measure of international competitiveness to be significant in explaining the inflation rate in almost all the countries. Further, agriculture related supply shocks were found to be significant in determining inflation in developing countries. For all countries, the forward-looking Phillips curve provides a better fit compared to the backward looking variant.

Patnaik (2010)[22] in an attempt to identify determinants of inflation in India carried out empirical estimation in a cointigrated VAR framework. The researcher also used Error Correction Mechanism on the cointegrated variables. The Impulse Response Function of the cointegrated VAR system indicated that there is a lag in the response of inflation to the changes in the other variables in the VAR system. The Fixed Error Variance Decomposition indicated that inflation in India is a mix of demand and supply side factors.

Inflation's effect on economic activity, and ultimately on people's well-being, is a primary concern of monetary policymakers and has been the focus of several studies. Many researchers have conducted studies in the past to throw light on possible effects of inflation in developed countries or developing countries. Some have magnified the impact of inflation on economic growth and investment (Kormendi and Meguire 1985, Fischer 1991, De G Jose 1993, Gomme 1993, Ericsson et. al 1993, Bullard and Keating 1995, and Barro 1995)[23].

Mallik and Chowdhury (2001)[24] examined the short-run and long-run dynamics of the relationship between inflation and economic growth for four South Asian economies: Bangladesh, India, Pakistan, and Sri Lanka. Applying co-integration and error correction models to the annual data retrieved from IMF and International Financial Statistics, they found two motivating results. First, the relationship between inflation and economic growth is positive and statistically significant for all four countries. Second, the sensitivity of growth to changes in inflation rates is smaller than that of inflation to changes in growth rates. David (2003)[25] used a structural vector autoregression framework for analyzing the effects of a permanent change in inflation on the long-run real interest rate and real output level in 14 industrialized countries. The results of the study indicate that a permanent increase in

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[21] Dua Pami and Upasna Gaur (2009), Determination of Inflation in an Open Economy Phillips Curve Framework: The Case of Developed and Developing Asian Countries, Working Paper No. 178, Centre for Development Economics, Delhi School of Economics, Delhi, April, pp-1-27

[22] Patnaik Anuradha (2010), Study of Inflation in India: A Cointegrated Vector Auto-regression Approach, Journal of Quantitative Economics, Vol. 8, No.1, January, pp-118-129

[23] Joseph H Haslag (1997), Output, Growth, Welfare, and Inflation: A Survey,Economic Review, Second Quarter,Federal Reserve Bank of Dallas, US

[24] Mallik G and Chowdhury A (2001), Inflation and Economic Growth: Evidence from South Asian Countries, Asian Pacific Development Journal, Vol. 8, No.1., pp. 123-135

[25] David E Rapach (2003),International Evidence on the Long-Run Impact of Inflation, Journal of Money, Credit, and Banking, Volume 35, Number 1, February 2003, pp. 23-48.

inflation lowers the long-run real interest rate in each country; a permanent increase in inflation also increases the long-run real output level in a number of countries. Ahmed and Mortaza (2005)[26] also explored the relationship between inflation and economic growth in Bangladesh, using annual data set on real GDP and CPI for the period of 1980 to 2005, and the co-integration and error correction models. The empirical evidence demonstrates that there exists a statistically significant long-run negative relationship between inflation and economic growth for the country as indicated by a statistically significant long-run negative relationship between CPI and real GDP.

Stilianos et. al (2006)[27], examined the causal relationship among nominal uncertainty, real uncertainty and macroeconomic performance measured by the inflation and output growth rates and using a bivariate generalized autoregressive conditionally heteroskedastic (GARCH) model of inflation and output growth. The study found that, firstly, inflation does cause negative welfare effects, both directly and indirectly, i.e. via the inflation uncertainty channel; secondly, in some countries, more inflation uncertainty provides an incentive to Central Banks to surprise the public by raising inflation unexpectedly; and thirdly, more variability in the business cycle leads to more output growth.

Erbaykal and Okuyan (2008)[28] examined the cointegration relationship between the inflation and the economic growth in Turkey using data that covered 1987:1-2006:2 periods, and the Bound Test developed by Pesaran et al. (2001). The results indicated that there exists no statistically significant long term relationship, but, a negative and statistically significant short term relationship between inflation and economic growth. Tan (2008)[29] ascertained whether there is any trade-off between inflation and economic growth in the founding members of ASEAN namely Malaysia, Singapore, Thailand, the Philippines and Indonesia and Japan and South Korea. The purpose of research was met by integrating the Phillips curve framework with Okun's theory. The researcher mobilized quarterly data of these countries spanning generally from 1991 through 2006/7. Empirical results of the study suggest that a trade-off albeit small exists between economic growth and inflation in Singapore, South Korea and Thailand after the Asian financial crisis of 1997/98.

Nasir and Nawaz (2010)[30] examined impact of the inflation rate on economic growth and also the nonlinear relationship between inflation and investment for Pakistan using annual data from 1961 to 2008. The results of Inflation and growth models supported the existence

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[26] Ahmed S and Mortaza G (2005), Inflation and Economic Growth in Bangladesh:1981- 2005,Policy Analysis Unit (PAU) Working Paper No. 0604

[27] Stilianos Fountas, Menelaos Karanasos and Jinki Kim (2006), Inflation Uncertainty, Output Growth Uncertainty and Macroeconomic Performance, Oxford Bulletin of Economics and Statistics, Department of Economics, University of Oxford, vol. 68(3), pp 319-343

[28] Erbaykal E and Okuyan HA (2008), Does Inflation Depress Economic Growth? Evidencefrom Turkey,International Research Journal of Finance and Economics, Issue 17, No. 1450-2887

[29] Tan Eu Chye (2008), Inflation and Economic Growth in ASEAN-5, Japan and South Korea,11th International Convention of the East Asian Economic Association, Manila, November15-16.

[30] Nasir Iqbal and Saima Nawaz (2010), Investment, Inflation and Economic Growth Nexus, The Pakistan Development Review, MPRA Paper, Vol. 48, No. 4.

of a nonlinear relationship with two thresholds (6 percent and 11 percent). The effect of inflation on economic growth, below the first threshold was found to be positive but insignificant; at moderate rates of inflation (between the two threshold levels), it was significant and strongly negative; and at high rates of inflation (above the second threshold), the effect was marginal but significantly negative. The results further indicated that inflation below the threshold level (7 percent) had positive but insignificant impact, while above the threshold it had strong negative and significant impact on the investment. Therefore, it was desirable to keep the inflation below 6 percent because it may be helpful for the achievement of robust economic growth and investment.

Omoke (2010)[31] studied the existence (or not) of a relationship between Inflation and economic growth in Nigeria using CPI and GDP data for a period from 1970 to 2005. The methodology used in the study included cointegration and Granger causality test. The results indicated no co-integrating relationship between Inflation and economic growth, and also that a unidirectional causality running from Inflation to economic growth. Mubariz and Omay (2011)[32] also examined causal relationships between inflation rate, outputgrowth rate, inflation uncertainty, and output uncertainty for ten Central and Eastern European transition countries. The researchers applied a bi-variate GARCH model that includes output growth and inflation rates for each country. To perform Granger causality tests they used conditional standard deviations of inflation and output to proxy nominal and real uncertainty. The findings of the study suggest that inflation rate induces uncertainty about both inflation rate and output growth rate, which is detrimental to real economic activity. Also, the output growth rate reduces macroeconomic uncertainty in some countries.

Some studies available in the literature have thrown light on the policy aspects of inflation. Pandit (1993)[33] observed that the government had been placing excessive emphasis on the demand pull factors overlooking the cost push. He stated that an across the board contractionary fiscal and monetary policy, even if effectively implemented, is not a good substitute for efficient resource utilization. In fact it may hurt the economy and result in stagnation, at least in the short run. The empirical results of the study conducted by Patra and Ray (2010)[34] indicated that inflation expectations play a significant role in setting and conducting monetary policy in modern India. They also mentioned that imperfect information regarding central bank's intentions has been one of the sources of inertia in the formation of inflation expectations.

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[31] Omoke Philip Chimobi (2010), Inflation and Economic Growth in Nigeria, Journal of Sustainable Development, Volume 3, No. 2, June.

[32] Mubariz Hasanov and Tolga Omay (2012), The Relationship between Inflation, Output Growth, and their Uncertainties: Evidence from selected CEE countries, Working Paper no. 20128, Department of Economics, Hacettepe University.

[33] Pandit V (1993), Controlling Inflation: Some Analytical & Empirical Issues, Economic &Political Weekly, Volume 28, January 2-9, pp. 39-42

[34] Patra MD and P Ray (2010), Inflation Expectations and Monetary Policy in India: An Empirical Exploration, IMF Working Paper, Working Paper No. 10/84.

Keskek and Orhan (2010)[35] investigated the impact of monetary policy on the relationship between inflation and inflation uncertainty using Turkish inflation data over January 1984 to October 2005. The results of GARCH-M models indicated that higher inflation rates lead to greater inflation uncertainty. The effect of inflation uncertainty on inflation was found to be negative mainly due to stabilization motives dominating the opportunistic incentives of monetary authorities. The researchers found strong evidences to support the view that inflation-oriented monetary policy has power to reduce the inflation persistence and eliminate uncertainty.

Keeping in mind the methodology and the results of various researches on the issue, the present study will focus on principal macroeconomic determinants and impact of inflation in BRICS countries. The researcher expects that it will be an addition to the existing knowledge on the subject. The findings of the study will be beneficial to the multiple groups of people, e.g., policy-makers, corporates, financial institutions, and the investors. It is further hoped that the study would open new vistas of research for academicians, researchers and students working in the area of macroeconomics in general and inflation in particular.

THE PROBLEM

The most recent financial crisis, which began in US in the summer of 2007 with the bursting of the sub-prime mortgage market, initially did not seem to affect emerging financial markets much. However, as the collapse of Lehman Brothers in September 2008 unleashed a full-blown systemic crisis with global risk aversion dramatically increasing, asset markets across countries and regions plunged. Stock markets tumbled in all emerging regions, large fiscal stimulus packages were implemented posing enormous challenges to long-run fiscal sustainability, while at the same time spreads on sovereign debt widened and currency markets came under pressure. Even emerging market economies with sound macroeconomic and financial preconditions built-up over the previous years were strongly affected.[36]

The initial contagion from US to financial markets of emerging market economies quickly morphed into real sector problems and revealed the strength of the linkages between the financial system, the housing sector, the banking sector and the credit market. In addition, the sudden emergence of the crisis, its severity and potentially long-lasting effects, became crucial elements for understanding the impact of external influences, oil prices, private investment, stock markets or even duration dependence on the likelihood of an expansion and contraction ending.[37]Such a rapid spillover from the financial to the real sector, whereby several emerging market economies saw their domestic industrial production, investment rates and more generally their GDP growth rate plunging, suggests that the nexus between

[35] Keskek Sami and Ohran Mehmet (2010), Applied economics- Abingdon: Routledge, Volume 42, pp 1281-1292.

[36] Mallick Sushanta K and Ricardo M Sousa (2011), Inflationary Pressures and Monetary Policy: Evidence from BRICS Economies, Brunel-Conference (April), www.qass.org.uk, P-2

[37] Ibid, P-3

monetary stability and financial stability may be strong and that financial factors may have an important impact on domestic demand in emerging market economies.

In addition to these developments, many emerging market economies are grappling with a massive surge in net capital inflows, in particular increased portfolio investment, and trying to manage these via central bank intervention in the foreign exchange market. The associated macroeconomic problems in emerging markets raise questions about the desired policy options, namely, regular interventions in the currency market and the use of capital controls.

NEED OF THE STUDY

Over the past few years, large fluctuations in the prices of industrial and agricultural commodities combined with volatile exchange rates have increased the volatility of inflation in BRICS economies, particularly India, China, and South Africa (See Table 1). Among the BRICS, Russia, Brazil, and South Africa received the direct positive impact of high commodity prices, while they acted as constraints on growth for China and India. In the second half of 2010, central banks grappled with the balancing act of anchoring high inflation along with managing fragile economic growth.[38]

Table 1: Inflation: Average Consumer Prices

Percent Change

Country	2000	2005	2006	2007	2008	2009	2010	2011	2012
Brazil	7.1	6.9	4.2	3.6	5.7	4.9	5.0	6.6	5.2
Russia	20.8	12.7	9.7	9.0	14.1	11.7	6.9	8.4	4.8
India	4.0	4.2	6.2	6.4	8.3	10.9	12.0	8.6	8.2
China	0.4	1.8	1.5	4.8	5.9	- 0.7	3.3	5.4	3.3
South Africa	5.4	3.4	4.7	7.1	11.5	7.1	4.3	5.0	5.7

Note: Data for the year 2012 is estimated.
Source: World Economic Outlook Database, IMF (17th April 2012)

Historically double-digit inflation has been a major threat to economic growth in many developing countries, but the monetary authority in these countries continues to maintain a pro-growth monetary policy stance, as these economies have a large negative output gap or excess productive capacity. Emerging markets have substantial excess capacity with regards to labor, and thereby require higher public investment on infrastructure to create conditions for sustained growth. As a result, understanding the real effect of monetary policy shocks in the five key emerging countries - namely, Brazil, Russia, India, China and South Africa, the so called BRICS – is crucial.

In the world of globalisation, inflation is a most leading and dynamic issue, almost a phenomenon permeated (or spreaded to) almost all the countries. Today, world is in the grip of soaring inflation and its dynamism has made it a crucial issue to be consideredby economists, researchers, and policy makers. The prominent questions to be addressed today are; whether monetary policy can exert powerful influence as a macroeconomic stabilization

[38] The BRICS Report, Oxford University Press, New Delhi, 2012, P-30

mechanism in emerging market economies; is there a scope for monetary authority in controlling inflation? And how effective is it in reviving output? Can it be part of the cause in generating a currency or financial crisis in these countries?

Further, the recent developments (as stated in above paragraphs), that have taken/ are taking place particularly in emerging market economies, have necessitated thorough analysis of the causes and effects of inflation, and stand by to work on finding appropriate solutions to address this Dilemma.Hence, the topic titled "Dynamics of Inflation in BRICS Countries: An Analysis of Nature, Causes & Impact" is selected for study.

RESEARCH DESIGN

OBJECTIVES

The proposed study will focus on following Objectives.

1. To develop understanding of the dynamics of inflation in BRICS countries.
2. To identify major macroeconomic determinants of inflation and to trace their impact on inflation in BRICS countries.
3. To analyze the impact of inflation on the macroeconomic performance of BRICS countries.
4. To examine influence of various policy simulations adopted in BRICS countries for managing inflation.
5. To suggest optimal policy options for managing inflation and macroeconomic stabilization in BRICS countries.

METHODOLOGY

The specific Research methodology with respect to above objectives will be as follows.

1. For understanding the dynamics of inflation, the researcher would analyze the trends and pattern of inflation in BRICS countries with the help of secondary information.
2. The determinants of inflation will be identified by reviewing available literature, and the impact of these factors on inflation in BRICS countries will be traced using Multivariate Regression Analysis with GARCH/ MGARCH.
3. For analyzing the impact of inflation on the macroeconomic performance of BRICS countries, the researcher will trace changes in selected macroeconomic performance indicators using Multivariate Regression Analysis with GARCH/ MGARCH technique.
4. The influence of policy simulations/ inflation management measures will be examined using intervention analysis with GARCH.
5. Optimal policy options will be explored on the basis of overall findings of the study.

SAMPLE, DATA SERIES AND SOURCES

(A) SAMPLE: BRICS countries, i.e. Brazil, Russia, India, China, and South Africa.

(B) DATA SERIES: Quarterly data for ten years spanning from April 2002 to March 2012 will be used for analysis of the impact of determinants of inflation, and also for the analysis of the impact of inflation on the macroeconomic performance of BRICS countries. For

examining the influence of policy simulations/ inflation control measures (intervention analysis), three years data from April 2009 to March 2012 will be used.

(C) DATA SOURCES: The researcher will collect required information from Books, Journals, Reports, Working papers, News papers and Statistical data base of IMF, IBRD, UNCTAD, and UNO. The information will also be collected from official websites Government/ Central Banks of BRICS countries.

TOOLS TO BE USED

The researcher plans to use following statistical/ econometrics tools.

1. Basic Descriptive: Mean, Standard Deviation, Skewness, kurtosis etc.
2. Cross Correlation and Unit Root (Augmented Dickey Fuller / Phillip Perron) Test.
3. Johansen Co-integration/ Granger Causality and Intervention Analysis.
4. ARCH/ GARCH/ MGARCH: The Autoregressive Conditional Heteroskedasticity (ARCH) technique was introduced by Robert F Engle, an Economist and Nobel Prize Winner (2003) in Economics to describe an approach to estimate volatility in financial markets, and Generalized ARCH (GARCH) by Bollerslev (1986) and Taylor (1986). These techniques are widely used in various branches of econometrics, especially in financial time series analysis (Bollerslev, Chou, and Kroner - 1992, and Bollerslev, Engle, and Nelson - 1994). Multi-variate ARCH/ GARCH (M-ARCH/ M-GARCH) and Dynamic Factor Models, eventually in a Bayesian framework, are the basic tools used to forecast correlations and covariances. The GARCH process is often preferred by financial modeling professionals, as it provides a more real-world context than other forms when trying to predict the prices and rates of financial instruments. Past researches show that the GARCH is the best modeling technique for forecasting and examining volatility (Gokcan 2000, Srinivasan 2011, Nadine McCloud and Yongmiao Hong 2011). The general process of modeling with GARCH involves: estimation of a best-fitted autoregressive model; computation of autocorrelations of the error term; and the test for significance.

For the purpose of data analysis, the researcher will make use of GARCH toolbox available in STATA 12.0 and E-Views 7.0 software.

PROPOSED CHAPTER PLAN

Chapter 1- Introduction
Chapter 2- BRICS: An Overview
Chapter 3- Review of Literature
Chapter 4- Analysis of the Impact of determinants of Inflation in BRICS countries
Chapter 5- Analysis of the Impact of Inflation on Macroeconomic Performance in BRICS countries
Chapter 6- Analysis of the Impact of Inflation Management Measures adopted in BRICS countries
Chapter 7- Conclusion and Suggestions

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